Stone Consulting & Design, P.C.

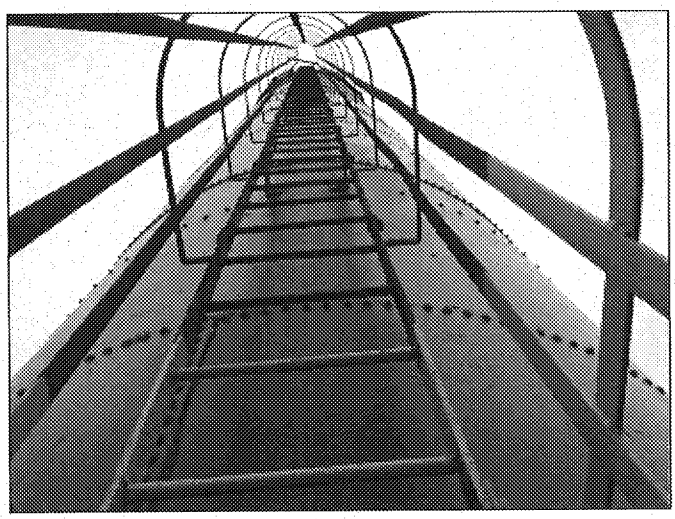
January 30, 2017

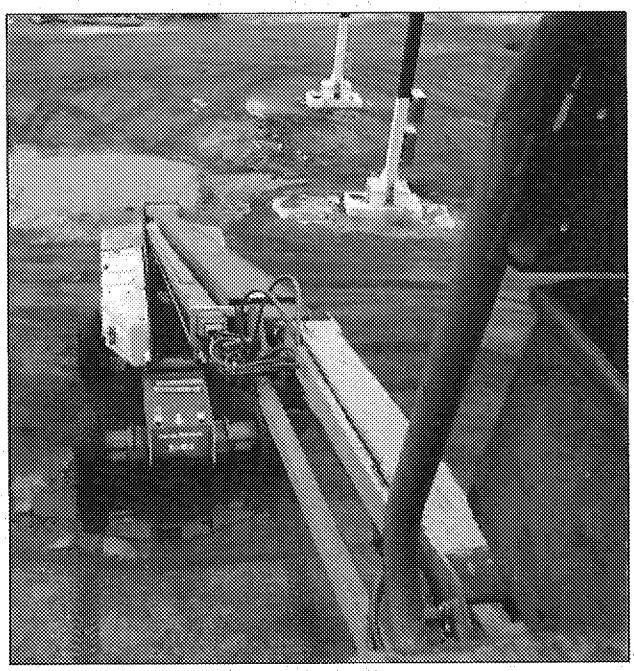
Robert Kuberka, Environmental Manager
Tonawanda Coke Corporation
3875 River Road
P.O. Box 5007
Tonawanda NY 14151-5007

Subject: LBA Scrubber, 13' Dia. x 103' Tall
Tonawanda Coke Corporation Facility
External Inspection

Dear Mr. Kuberka:

Per the request of Chuck Lauricella, I inspected the LBA scrubber structure during the afternoon of December 28, 2016 with the assistance of Ken Thrun, Plant Engineer, who arranged for the man lift and operator. My inspection consisted of inspecting the base, climbing the man ladder on the west side and using a man lift to inspect the structure from the opposite side.





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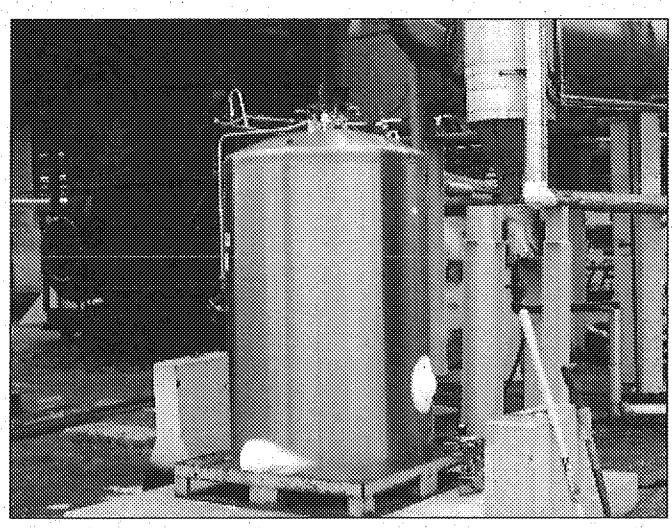
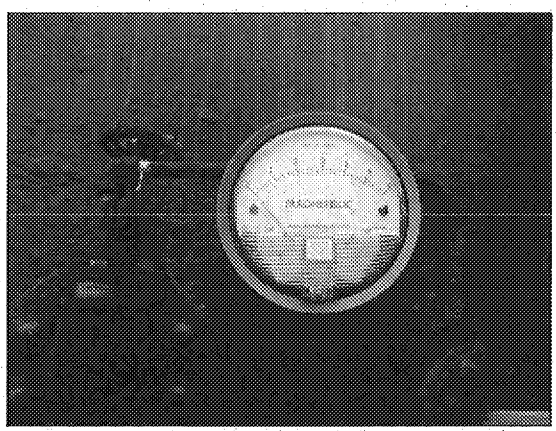
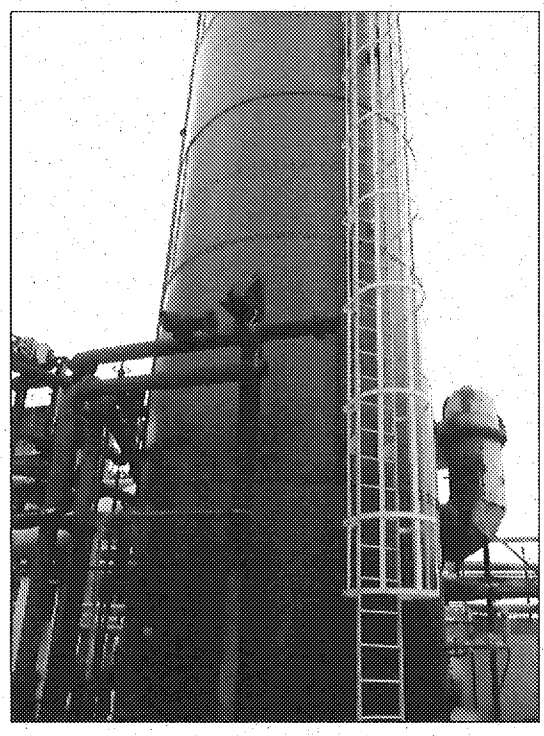
The structure is currently slightly pressurized with nitrogen so no internal inspection could be completed. The purpose of this inspection is to confirm structural integrity as part of the approval process to discontinue the nitrogen pressurization. Although the gage reads "0", the needle is away from the stop and fluctuates slightly, indicating some pressure is present.



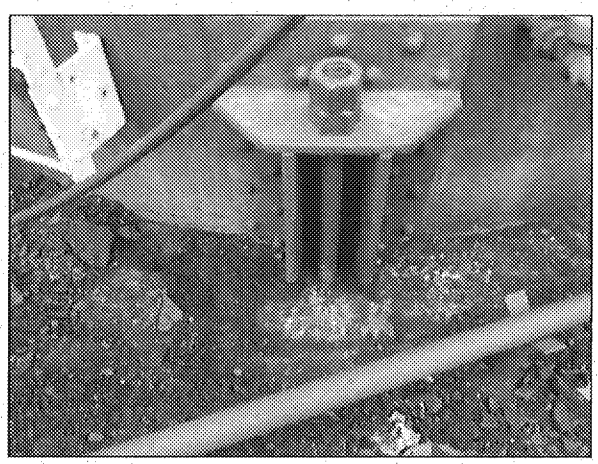


Although the scrubber appears to be a vertical tank, it is not. The structure is better described as a tower or stack. The difference is a tank is subject to the fluid pressure from the weight of its contents which would be significant if its contents were water or any liquid, but this tower is only subject to the modest air pressure of the coke oven gas. The spraying fluids from the scrubbing process are pumped away and do not fill the structure.

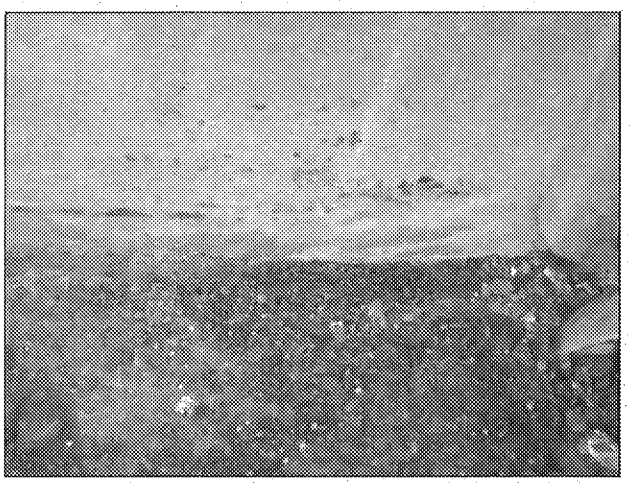
From a structural perspective, the most critical area of the structure is the base. Not only is the entire weight of the structure supported by the base, but more significantly, the rigidity of the base resists the wind load. The wind is the most significant force acting on the structure.



All eight of the perimeter anchor bolts were closely inspected as well as the walls of the structure in the vicinity of the anchor bolts connections. No signs of deterioration or cracking were noted.



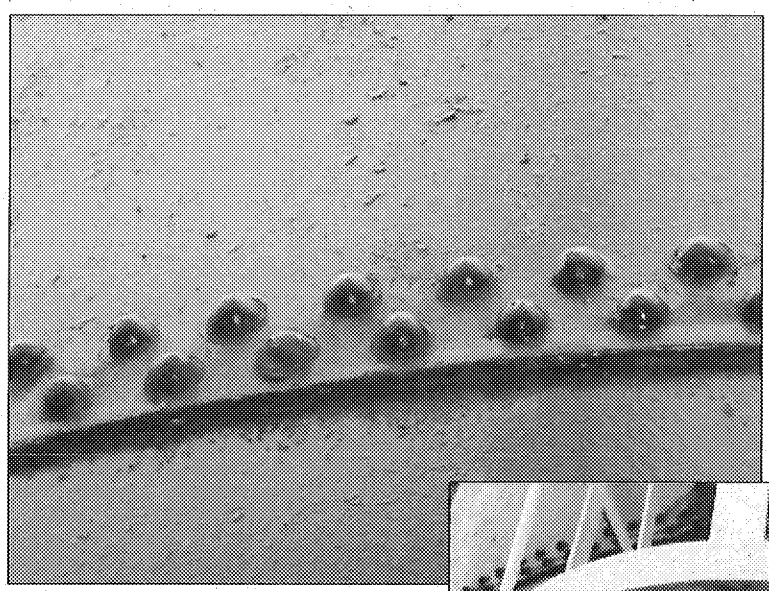
At the ground line, the steel structure transitions to concrete. It would be better if this transition occurred above the ground by 6" to 12", but it does not. Digging and scraping was required to expose the concrete. Only minor corrosion of the buried steel was observed.

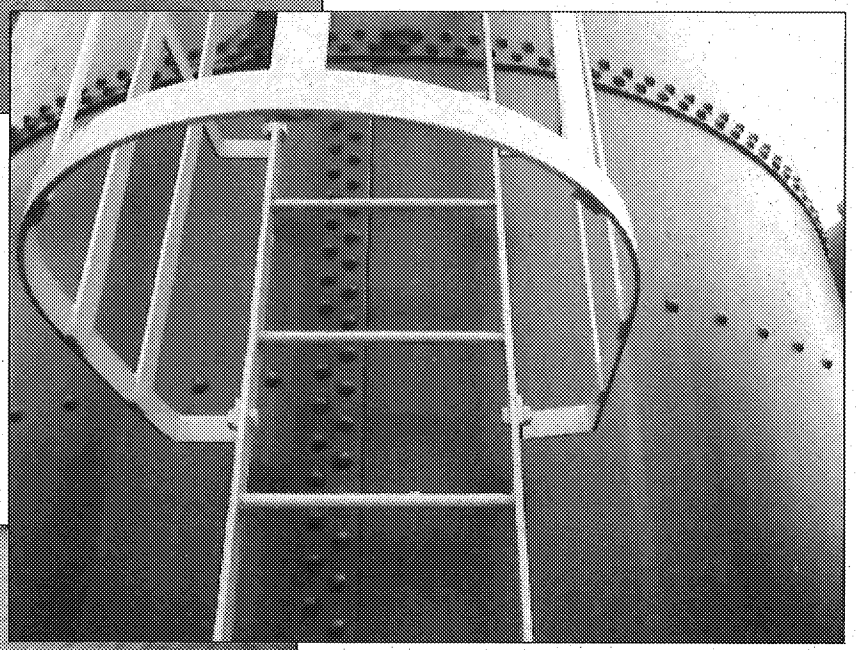


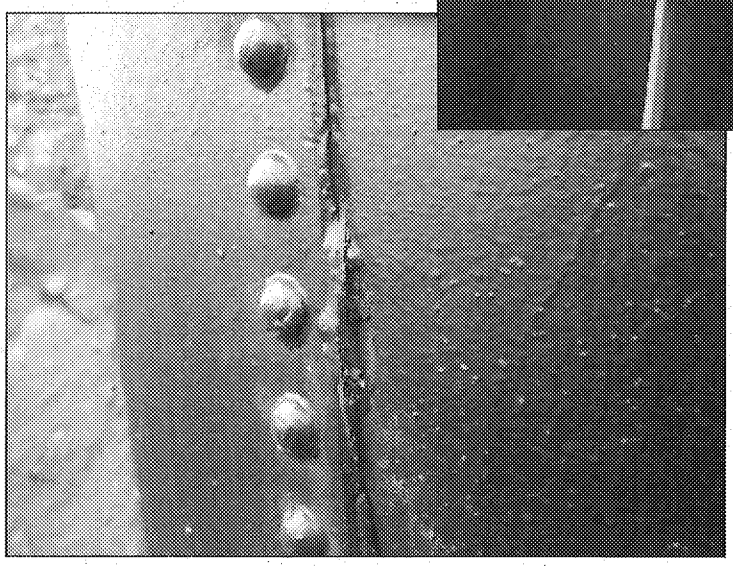
The steel plate is ½" thick here, so the observed corrosion is insignificant. Lowering the ground level around the perimeter and improving the drainage in this area is recommended to prevent corrosion at the base. I recognize the condition I observed in December may not be typical and the drainage may be adequate.

The structure is 90 years old and built in a time when riveted construction was used. A possible problem for this type of construction would be "pack rust" at the lap joints. Two surfaces of overlapping steel are riveted together, and any corrosion between the two surfaces pushes the member apart. This was not observed on the structure,

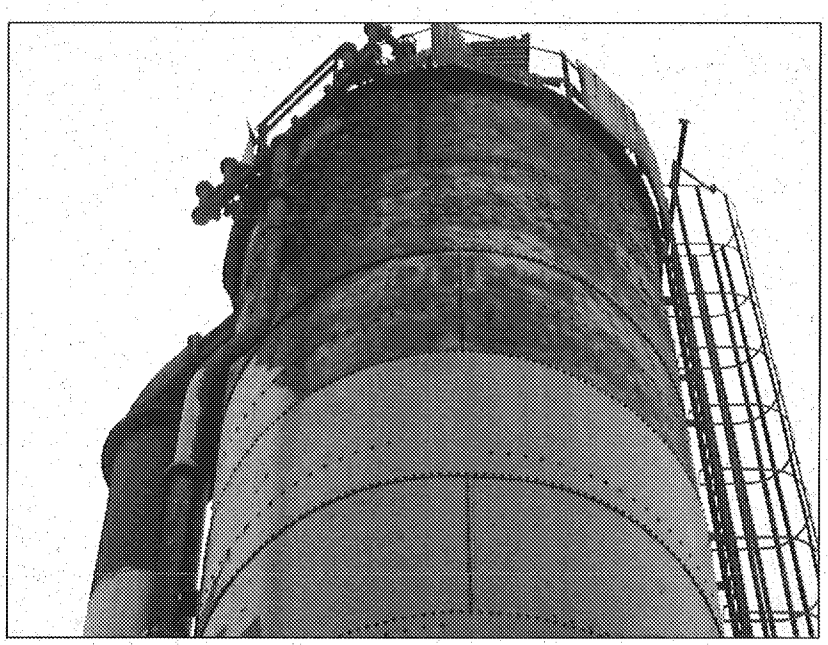
except for one small location. I only include this photo to illustrate the condition described.

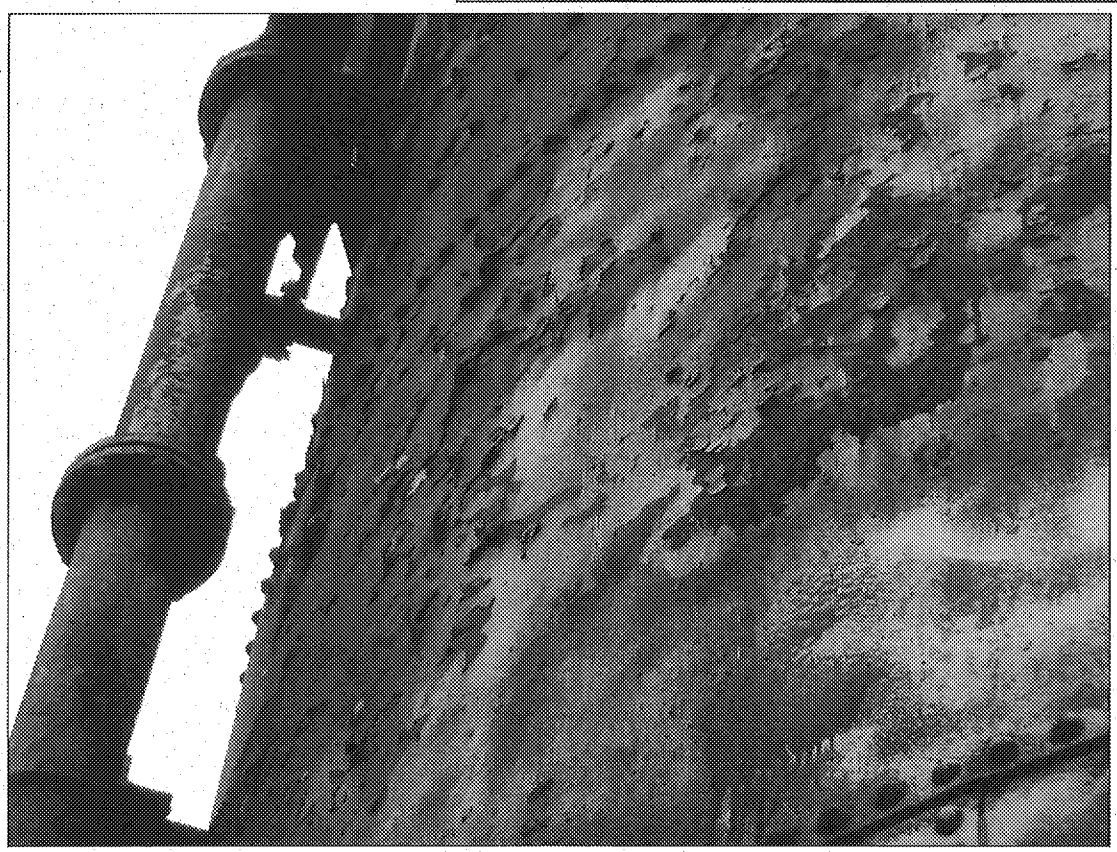






The structure was recently painted, but not all the way to the top. While the more recently painted portions show no corrosion, even the less recently painted areas show only peeling paint and light rust. Near the top, the wall is 5/16" thick steel plate making the observed rust insignificant.





According to a 2012 memo from Connestoga-Rovers & Associates: on May 1, 2012, prior to the initiation of steam purging, a leak survey was conducted on the structure while it still contained about 1 psi of coke oven gas pressure. The results of this survey found no leaks above the Method-21 500 ppm level.

Facility engineering staff have also informed me that, prior to completing gas purging of the structure in May 2012, they had:

1. Conducted visual observations (based on their experience of the integrity of coke oven gas piping and structures) and noticed that the structure was still in very good shape considering its age.

2. Conducted passive pressure tests above 1 psi with steam during the initial gas purge, steam cleaned the vessel up to 2 psi steam pressure, and later (after pipe blanking the structure at the inlet and outlet) held the vessel at 1 psi nitrogen pressure for an extended period of time prior to the removal of the inlet and outlet piping spools.

3. Taken wall thickness measurements in approximately five locations in the two lower sections of the structure that indicated very little wall thickness deterioration compared to the design prints.

Tonawanda Coke's conclusion based on these informal unrecorded observations and tests was that this structure could still be used in the future if needed.

They had me conduct this inspection to help verify their informal conclusions.

CONCLUSION

Based on a study of the structural design and foundation design and my observations of the exterior of this structure, I see no indication of any structural issue that would prevent some future reuse of this structure.

Respectfully submitted,

Stone Consulting & Design, P.C.

John M. Ludwig, P.E.
Vice President Engineering

JML/fsc